SELECTION FOR LOW SOIL FERTILITY BEAN LINES TOLERANT TO ROOT ROT

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Introduction

Common bean is the worlds' most important food legume, accounting for about 57% of the worlds' food legume production (CGIAR, 2001). In Africa, production of the crop is constrained by a number of diseases, of which root rots are among the most important. Recently the root rot problem has increased in Eastern and Central Africa particularly in areas of intensive bean production and low soil fertility (Wortman et al., 1998). The disease is severe in soils deficient in P, N, exchangeable bases and AL and Mn toxicity. Genetic resistance is the most effective control strategy for the disease since it is small-scale farmers with limited resources to purchase external inputs grow the crop. Work has been done to identify sources of resistance to root rots and such sources include RWR 719, SCAM 80CM /15, MLB 49 – 89A and RWR 432 (Otsyula et al., 1998). However there is still need to identify more sources of resistance especially in the case of variability of the pathogen. And more to this, some of the available sources of resistance are so far not of acceptable seed types by farmers and other end users. Selection for bean lines tolerant to root rots and low soil fertility is a priority for the regional breeding programmes and started recently. This report presents progress in selection of low soil fertility lines possessing levels of root rot tolerance that have been identified in Uganda.

Materials and methods

Eighteen genotypes in the BILFA III nursery were grown in a replicated trial in Kachwekano in the second season (October – December) of 1999 at a spot that was very low in fertility. Out of the lines, eight best genotypes namely RWR 2075, RWR 1873, RWR 1946, C_{30}-P_{21}, G 22501, DB 201/77/1, RWK 10 and G8864 x MASAI were selected based on yield and seed types and were tested further in a preliminary yield trial at Namulonge, Nakabango, and Kachwekano in the first season (April – July) of 2000. Kachwekano, in southwestern Uganda has low soil fertility and is prone to root rot disease. Namulonge and Nakabango sites are of moderate and high soil fertility, respectively. In the first season (March – July) of 2001, the genotypes were tested further in an intermediate yield trial. During this season, very severe root rot disease was experienced at Kachwekano and to measure the extent of root rot damage, data was collected on plant stand count before harvest and mean seed yield. Analysis of variance was performed following PROC GLM SAS procedure (SAS Institute, 1988).

Results and Discussion

During the second season of 1999, the lines RWR 2075, DB 201/77/1, RWR 1873, RWR 1946, C_{30}-P_{21}, G 22501 and G8864 x MASAI were observed with mean seed yields of 1139, 931, 803, 775, 653, 514 and 414 kg/ha, respectively, under low soil fertility. In 2000, mean seed yield of the BILFA selections across sites ranged from 755 to 1075 kg/ha under both low and high soil fertility. During the first season of 2001, the highest yield was observed at Nakabango, where it ranged from 375 kg/ha to 1050 kg/ha. At Namulonge, yield varied from 217 kg/ha to 733 kg/ha, while plant stand count of between 83 and 129 was recorded. At Kachwekano (with root rot) the average plant stand count ranged between 19 and 129, while the mean grain yield varied from 83 kg/ha to 1567 kg/ha. Across sites, the highest yielding genotypes were RWR 1946, RWR 1873, and RWR 2075, all which had been previously selected from BILFA III. Check varieties NABE 4 and K 131 were also observed with moderate yields of 647 and 756 kg/ha, respectively. This suggests that these genotypes perform well both under low and moderate soil fertility. A low yield at Kachwekano of the remaining genotypes is attributed to the severe root rot disease, which was experienced during the season. Results from this work suggest that the lines RWR 2075, RWR 1946 and RWR 1873 and NABE 4 are probably potential sources of resistance to root rots in Uganda, particularly in the southwestern part of the country where root rot is a major problem. Activities are underway to evaluate the materials further on farmers' fields where root rot problem is prevalent. There is still need to screen these materials with different species of the pathogen in the screen house and other hot spot sites for the disease.

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